

بیماری جاروک مرکبات (لیموترش)
Witches' brooms disease of lime (WBDL)



عامل بیماری
Phytoplasma aurantifolia

All types of acid limes (*Citrus aurantifolia*) is susceptible.

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Symptoms caused by *Phytoplasma aurantifolia*

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Symptoms:

A common symptom resulting from *Phytoplasma* infection is **phyllody**, a condition in which a plant produces **leaf like** structures instead of **flowers**.

Leaves: **yellowing**, Many phytoplasma-infected plants acquire a **bushy** or **witches' broom** appearance due to **changes** in their **normal** growth patterns.

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Epidemiology:

Phytoplasmas are mainly **spread** by **insects** in the families Cicadellidae (**leafhoppers**), Fulgoridae (**planthoppers**), and Psyllidae (**psyllids**), which feed on the **phloem tissues** of infected plants.

Phytoplasmas may also be transmitted from infected to healthy plants through the **parasitic plant dodder** (*Cuscuta* sp.). Recently the possibility that phytoplasmas were transmitted by **seed** has also been reported.

Phytoplasmas can also be spread via **vegetative propagation** such as the **grafting** of infected plants onto healthy plants, propagation through **cuttings, micropropagation.....**

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Management:

Outbreaks of *Phytoplasma* disease epidemics can be controlled either by **controlling** the **vectors**, or by **eliminating** the **pathogens** from infected plants by **meristem tip culture**, by **antibiotics** or by other chemicals.

At present, insect vector control using **pesticides** is the method of choice for limiting outbreaks of *Phytoplasma* diseases.

On the other hand, **removal** of **sources of inoculum** is efficient for **reducing** mollicute diseases spread by monophagous vectors feeding on infected plants.

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Symptoms:

Because of the **slow** development of symptoms and the **long survival** of affected trees, its **detection** is difficult. However, **yields** are **reduced** drastically. The infected trees show a bunched and **stunted** and has **compact growth**.

Twigs: die back

Leaves: are small, often **mottled** and **chlorotic**, defoliation in **winter**.

Fruits: trees produce **fewer fruit**. Fruit are **small, lopsided**, delayed **coloration**, **aborted seeds**, usually **sour** and **bitter** and have an unpleasant **odor**.

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استابورن یا ریزبرگی مرکبات
Citrus Stubborn



عامل بیماری
Spiroplasma citrii

This is present in **hot and dry** areas.
Sweet oranges and **grapefruits** are susceptible.

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Symptoms caused by *Spiroplasma citrii*

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Epidemiology:

Citrus stubborn is transmitted by budding and grafting, naturally in orchards by several leafhoppers such as: *Circulifer tenellus*, *Neoaliturus haemoceps* and *Scaphytopius nitridus*.

Management:

The control of disease depends on the use of spiroplasma-free budwood and rootstocks, as well as early detection and removal of infected trees. Use tetracycline antibiotics in young trees.

Symptoms:

Leaves: show more number of elongated translucent areas on the veins, both vein clearing and vein corking, leaf cupping.
Root and Twigs: Roots decay and twigs die back.
Fruits: Fruit set diminishes.
Bark: Stem pitting, on the inner surface of the bark.

In general: the symptoms are two types:

Slow decline: vein clearing, defoliation of leaf in autumn (Petioles remain).

Quick decline: In summer, Stem pitting, seedling yellowing. Some of the infected trees decline overnight and dry up in 2-3 days.

بیماری تریستزای مرکبات

Quick decline



عامل بیماری

Citrus tristeza virus (CTV)

Clostrivirus, 200x11-12 nm. This is a phloem-restricted in natural citrus hosts.

West Indian lime (*Citrus aurantifolia*) is the most powerful tool to detect the virus.



Symptoms caused by CTV

Disease cycle:

Two strains of tristeza, viz the **Virulent** or **fulminate** and **avirulent** or **mild** have been recognized.

Among the two strains of virus, one of which is an independent agent of **stem-pitting**, while the other, known as **seedling yellows**.

Insect-Vector transmission of the virus by several insects viz., by *Toxoptera citricidus* (not in Iran), *T. aurantii*, *Aphis gossypii*, *A. craccivora*, *A. spiraeicola*. *Myzus persica*.

Besides insects, the virus can be transmitted by **budding**, **grafting** and **odder**.

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If you don't **know** your real **price**, be ready for **affliction**....

Anthony Robbins

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Management:

All **diseased** trees should be **removed** and fresh planting should be done

Pre-immunized seedling with **mild** strain of tristeza virus should be used

Virus free seedling should be used

Periodical spray with monocrotophos 0.05% reduces the secondary spread.

Use **tolerance** and **resistance** varieties of citrus.

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بیماری پژمردگی فوزاریومی یا بایود خرما

Fusarium wilt or Bayoud



عامل بیماری

Fusarium oxysporum f.sp. *albedinis*

The name bayoud comes from the Arabic word, "abiadh", meaning white which refers to the **whitening** of the **fronds** of diseased palms.

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Symptoms:

Leaves: The first symptom of the disease appears on a **palm leaf** of the middle crown. This leaf takes on an **ash grey** colour and then **withens**, from **bottom to top**. After **one side** has been affected, the whitening **begins** on the other side.

A **brown stain** appears **lengthwise** on the **dorsal side** of the **rachis** and advances from the **base to the tip** of the **frond**. This **whitening and dying process** of the **pinnae** may take from a few days to **several weeks**.

The disease advances ineluctably and the palm **dies** when the **terminal bud** is affected. The palm can **die** at **any time** from several **weeks** to several **months** after the **appearance** of the first symptoms. **The rapid evolution of the symptoms** depends mainly on **planting conditions and on variety**.

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Symptoms caused by Bayoud

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Symptoms:

Root: A small number of disease infected roots, **reddish** in colour, are revealed when an affected palm is uprooted. The **spots** are **large** and **numerous** towards the **base of the stipe**. As they advance towards the **upper parts** of the palm, the coloured conducting fascicles separate and their complicated path inside the **healthy tissues** can be followed.

Fronds: Palm **fronds** manifesting external symptoms exhibit a **reddish brown** colour when **cut**, showing highly coloured conducting fascicles. There is, therefore, a continuity of **vascular symptoms** that exist **from the roots of the palm to the tips of the palm fronds**.

The observation of symptoms is necessary to **recognise** the **bayoud**, but to identify this disease with certainty, samples of affected fronds must be **analysed** by a **specialised laboratory**.

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Disease cycle:

Fusarium o. f.sp. albedinis is preserved in the form of **chlamydo spores** in the **dead tissues** of infected palm, especially in the **roots** which have been killed by the disease and in the **soil**.

Contamination occurs regularly from palm to palm and more rapidly as the **amount of irrigation increases**. The appearance of the disease in locations **far from the original infected area** is **caused primarily by the transport of infected offshoots or palm fragments harbouring the fungus**.

Many plants are often grown as **intercrops** in palm groves, notably **Medicago sativa**, **Lawsonia inermis** and **vegetables**. These plants can harbour the bayoud organism **without manifesting** any symptoms.

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Management:

Soil treatment of this type of disease is **destined**.

Palms are **uprooted** and **incinerated** on the spot.

The **soil** is then treated with **methyl bromide** or **chloropicrin** and the area closed off with **replanting** prohibited until further notice.

Since the contamination occurs mainly by **root contact**, disease-free palms can be isolated by **digging a trench of 2 m deep around them**. Water should be provided by a trough bridging the rest of the grove to this isolated plot. Under these conditions these palms can be **protected** for more than **10 years**.

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Symptoms:

It develops **sub-epidermal**, in small spots on **both sides** of the pinnae leaves, on the **rachis** and on the **leaf base**.

The numerous **fruiting structures** emerge as **small-yellow/brown to black sori**, 1 to 3 mm in diameter, with two layers. These **sori** are **abundant** on **three year-old** leaves, **conspicuous** on **two year-old**, but **absent** or infrequent on **one year-old** leaves. **This is because of the 10 - 11 month incubation cycle for this pathogen**. On a leaf, sori are **abundant** on **apical pinnae**, less **abundant** on the **middle** section becoming even **less** on the **basal section**.

The **normal 6 - 8 year** life of date palm fronds will be **reduced** to 3 years by **Graphiola** disease and heavily infected leaves **die** prematurely which consequently **reduce yield** of the palm.

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بیماری زگیل سیاه، سیاهک دروغی یا لکه گرافیولایی خرما
Graphiola leaf spot, False smut



Kingdom: Fungi
Phylum: Basidiomycota
Class: Exobasidiomycetes
Order: Exobasidiales
Genus: *Graphiola*

عامل بیماری
Graphiola phoenicis

This is a **smut** fungus. Both of ***Phoenix canariensis*** and ***Ph. dactylifera*** are susceptible.

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Symptoms caused by *G. phoenicis*

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Management:

Control measures include **leaf pruning** coupled with **treatment with Bordeaux mixture**.

Any large spectrum fungicide (**mancozeb**, cupric hydroxide, cupric hydroxide + **maneb**, or copper oxychloride + maneb + zineb; **3 to 4** applications on a **15-day** schedule **after sporulation**, have been recommended).

Genetic **tolerance** has been **found** in some.

Symptoms:

The first **visible** symptom of the disease appears on the **external surface of unopened spathes** and is in the form of a **brownish or rusty-coloured area**.

It is most apparent on the **internal face of the spathe** where the fungus has already begun to **infect the inflorescence**. When the infected spathes split, they reveal **partial or complete destruction of the flowers and strands**.

Severely damaged spathes may remain closed and their internal contents may be completely infected. The **inflorescences become dry and covered with powdery fructifications of the fungus**.

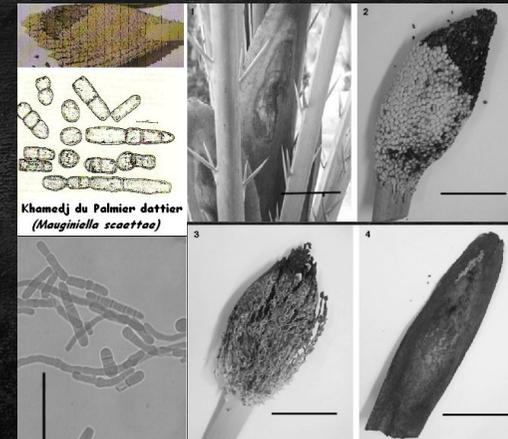
بیماری پوسیدگی گل آذین یا خامج خرما
Khamedj disease or inflorescence rot

Kingdom: Fungi
Phylum: Ascomycota
Class: *Incertae sedis*
Order: *Incertae sedis*
Genus: *Mauginiella*



عامل بیماری
Mauginiella scattae

Fusarium moniliforme and *Thielaviopsis paradoxa* may rarely cause **inflorescence rot**.



Khamedj du Palmier dattier
(*Mauginiella scattae*)

Symptoms caused by *M. scattae*

Epidemiology:

It causes damage on inflorescences in **neglected palm** groves in **hot** and **humid** regions, or in areas with prolonged periods of **heavy rain**, 2 to 3 months **before emergence** of **spathes**.

The disease can reappear each year on the same palm with the same intensity and it is estimated that, in serious cases, 30 - 40 kg of fruits are lost annually.

Transmission of the disease **from** one palm to the next occurs **through** the **contamination** of **male inflorescences** during the **pollination period**. The infection of the **young inflorescence** occurs early and happens when the **spathe** is **still hidden** in the **leaf bases**. The fungus penetrates **directly** into the spathe and then **reaches** the inflorescences where the **fungus sporulates** abundantly.

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The **losers** find **problem** in every **answer**....

But,
the **winners** find an **answer** in every **problem**....

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Management:

The **frequent** appearance of the disease in neglected date plantations indicates that **good sanitation** and **efficient maintenance** is the **first step** in the control of **Khamedj** disease.

The **collection** and **burning** of all infected inflorescences and spathes should be **followed** by **treating** the diseased palms with the following **fungicides** after the **harvest** and **one month before** the **emergence** of **spathes**: a **bordeaux mixture** or a copper (1/3), or a 4 % **thirame** spray at the rate of 8 litres per palm.

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